NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

MANURE TRANSFER

(No.)
CODE 634

DEFINITION

A manure conveyance system using structures, conduits, or equipment.

PURPOSE

To transfer animal manure (bedding material, spilled feed, process and wash water, and other residues associated with animal production may be included) through a hopper or reception pit, a pump (if applicable), and a conduit to;

- A manure storage/treatment facility,
- A loading area, and
- To agricultural land for final utilization to include application of manure to the utilization area.

CONDITIONS WHERE PRACTICE APPLIES

The manure transfer component is a part of a planned agricultural manure management system.

Where manure is generated by animal production or processing; and a conveyance system is necessary to transfer manure from the source to a storage/treatment facility and/or a loading area, and/or from a storage / treatment facility to an area for utilization.

It can be installed without polluting air, soil, or water resources, and

The equipment, labor, and other resources are available to operate the system.

CRITERIA

Manure transfer components shall comply with all federal, state, and local laws, rules and regulations.

Environmental protection. All manure transfer equipment shall be liquid tight and well maintained to help prevent accidental damage or failure that could result in an uncontrolled discharge of manure and possible contamination of other water.

Sanitation needs of all conveyance equipment that leaves the farm shall be evaluated in order to prevent the spread of disease.

Material. All material used shall be corrosion resistant.

Compatibility and capacity. The manure transfer system needs to be compatible with all components of the manure management system. The transfer system must have the capacity to meet the requirements for loading and unloading the manure management system.

Topography. Utilization of topography to generate head to reduce pumping requirements shall be considered.

The elevation differences between the source of the manure and its final location play a significant role in deciding which system can be used. Gravity systems must have sufficient working head to be feasible. Mechanical and pumping systems are limited to the height and head loss based on the capabilities of the equipment.

Structures. All structural components shall be designed in accordance with Practice Standard 313, Manure Storage Facility. When needed, covers shall be designed to support the anticipated dead and live loads.

Reception pits should be sized to prevent excessive cycling of transfer pumps.

Openings to structures to receive manure from alley scrape collection systems shall be a minimum of 9 square feet with one dimension no smaller than 4 feet. The opening shall be equipped with a grate designed to support the anticipated loads. Openings in grates shall be less than six inches across.

When curbs are needed in conjunction with structures, they shall be of sufficient height to insure total manure flow into the structure and be adequately anchored.

The reception pit or hopper shall be located to provide acceptable access for the scraping and cleaning equipment.

Pumps. Pumps installed for manure transfer shall

meet the requirements of Practice Standard 533, Pumping Plant for Water Control. Pumps shall be sized to transfer manure at required system head and volume. Type of pump shall be based on the consistency of manure. Consideration for pump installations shall be based on manufacturer's recommendations.

Chopper style pumps are recommended for transfer purposes.

These types of systems utilize a temporary storage and pump to transfer the manure over separators and to ponds. The temporary storage collects and stores the manure and serves as a pumping port or platform. Pumps are used to agitate and transfer the manure. These systems are limited by working head and pipeline distances, as well as available power sources.

Pipelines. Design of pipelines shall be in accordance with Practice Standard 430, Irrigation Water Conveyance, and shall have smooth interiors.

Adjustments to the pressure rating for plastic pipe shall be made based upon the temperature of the manure.

Pipelines from enclosed buildings shall be provided with a water-sealed trap and vent or similar devices where necessary to control gas entry into buildings.

The minimum pipeline capacity from collection facilities to storage / treatment facilities shall be based on the maximum daily flow anticipated. This capacity shall insure that the storage / treatment facilities can be emptied within the time limits stated in the management plan for nutrient management. Pipelines shall be designed to have a minimum velocity of 2 feet per second. Flow velocity should not normally exceed 5 feet per second. Where ruminant manure is transferred in a gravity system, velocities can be reduced if a minimum of 5 feet of head is provided on the pipe system.

The diameter of the pipeline should be considered when determining the amount of time the manure will travel within the system. Manure that enters the pipe should exit within 48 hours. In the event that sawdust or chopped paper is used for bedding, less time shall be allowed to prevent formation of a dry plug.

Clean-out access shall be provided for gravity pipelines at a maximum interval of 200 feet for lines carrying non-bedded manure and 150 feet for pipelines carrying bedded manure. Gravity pipelines shall not have horizontal curves or bends except minor deflections (less than 10 degrees) in the pipe joints unless special design considerations are used. Changes in horizontal direction should be made in drop structures or manholes.

All changes in vertical direction shall be made with watertight fittings compatible with the type of pipe being used.

A vent shall be placed in any gravity transfer system at a location beyond the entrances to the pipeline to alleviate air locking of the system. The vent shall be a minimum of one-fourth the diameter of the nominal pipe size.

All entrances to the pipes shall be made with a smooth, square edge. Vertical changes in direction in a pipeline shall not be greater than 45° angles at any one time.

Concrete lined ditches. These ditches shall be designed in accordance with Practice Standard 428A, Irrigation Water Conveyance-Non-reinforced Concrete Ditch and Canal Lining. A minimum design velocity of 1.5 feet per second shall be used.

Sprinkler irrigation systems. Sprinklers or sprinkler systems shall be designed in accordance with Practice Standard 442, Irrigation System, Sprinkler. System capacity shall be adequate to apply the required volume of manure at a rate and uniformity that shall prevent runoff and not exceed the nutrient requirement of the crop. Nozzle size shall be appropriate for the consistency of the manure applied. Sprinkler-applied manure water shall contain less than one- percent solids unless provisions are made for straining or filtering before application.

Mobile spreaders. Manure spreaders and/or tank wagons shall have adequate capacity to insure the emptying of storage / treatment facilities within appropriate time periods as stated in the operation and maintenance plan.

Manure utilization. Manure shall be applied to the irrigated area in amounts and at a time consistent with the nutrient management plan and Practice Standard 633, Waste Utilization.

Miscellaneous. Surface and subsurface systems used in conjunction with gravity application shall be designed to insure uniform application amounts.

Safety: The design shall consider the safety and health of humans and animals during construction, operation, and maintenance.

Open structures shall be provided with covers or barriers such as grates or fences. Fences shall comply with Practice Standard 382, Fence.

Excavation depths near or under building foundations should be the minimum required. Support for the foundation may be necessary to protect the building and workers during construction.

Manure spreaders or tank wagons shall be towed with properly sized equipment.

To insure the safety of humans and livestock to help prevent explosion, poisoning, or asphyxiation, warning signs shall be posted in enclosed manure holding structures, and near hoppers and reception pits, describing the hazards associated with the hopper and accumulated gases, as appropriate. Ladders, guard rails, shields, lighting, and other devices shall be installed as needed. Safety shields or devices supplied with equipment shall not be removed or altered in any way.

CONSIDERATIONS

The following manure transfer systems should be considered for handling liquid manure:

- Gravity systems, which include a hopper or inlet system, a pipeline and outlet, slopes, gutters, or chutes.
- Mechanical, direct transfer systems, which may include a hopper, ram pump, chute, chain, valves, and pipeline.
- Storage and pump system, which include storage, a reception pit or collection tank, pump, valves, pipeline, separators, and media filters.

Location. The manure transfer system should be located near, and have direct access to the source of the manure such as gutter cleaners, pushoffs, sumps, or drains. It should be accessible for operation and maintenance. The system should take a direct path from the source of the manure to its final destination.

Capability. Management flexibility such as alternative transfer methods, supplemental water, and temporary stacking or mixing capacity should be considered where dry or frozen manure might be a problem.

Consider the following:

- Compatibility to joint use of manure transfer with irrigation system,
- System for flushing pipelines with clean water,
- Provisions for cleaning out solids deposited in ditches, and
- Economics.

PLANS AND SPECIFICATIONS

Plans and specifications for manure transfer systems shall be in accordance with this standard and shall describe the requirements for applying the practice to achieve this intended purpose.

The plans must show all features required for the proper installation and functioning of the practice, including (but not limited to):

- Location map,
- Plan view,
- Profiles,
- Sub-grades,
- Foundation requirements,
- Structural design,
- Inverts,
- Cross sections with details such as bedding and elevations,
- Type of pipelines,
- Pump size and horsepower requirement.
- Fasteners,
- Joint seals,
- Drainage,
- Erosion/sediment control,
- Access, and
- Safety devices.

OPERATION AND MAINTENANCE

Site specific operation and maintenance requirements shall be developed for each system, and shall be provided to and reviewed with the operator/owner. These requirements shall be consistent with Practice Standards 313, Manure Storage Facility, 590, Nutrient Management, and 359, Manure Treatment Lagoon, and equipment manufacturer's requirements and recommendations for separate components.

Gravity system design shall include instructions to add water to the system when it appears to function slower or when material has been added which could affect the consistency of manure and performance of the system. The water shall be added at the bottom of the hoppers.

Frozen or dried manure can cause plugging of the transfer system. Before loading frozen manure into the transfer system it should be piled or stacked until it thaws. Dried manure should be liquefied before loading into the system.

As a minimum, the O&M plan shall contain items related to maintenance of the system as follows:

- Integrity,
- Operational procedures,
- Safety requirements, and
- A contingency or emergency procedure to be followed in the event of accidental spill or seepage or unforeseen circumstances.

In the event a custom operator empties the storage facility, it shall be the responsibility of landowner/operator to review the plan with the custom operator prior to operating the system.

DOCUMENTATION

A manure transfer system shall not be reported as complete until adequate documentation, showing proper installation, has been prepared. The as-built drawings shall be signed and dated by the person with installation approval authority to indicate that the structure was installed as designed, except as noted by redline changes.

In addition, the as-built drawings shall include the names of the installer, component manufacturer, and date of completion of each system component. The as-built records shall also include any applicable "Statement of Conformance" presented or certified by suppliers of structures or equipment. The design folder, as-built drawings, certifications and specifications shall be filed in the Comprehensive Nutrient Management Plan.